

1 WHAT IS CLAIMED IS:

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- 3 1. An optical switch array assembly comprising:
- 4 a silicon substrate,
- 5 an optical switch array disposed in the silicon substrate,
- 6 a driving circuit integrated in the silicon substrate with the optical
- 7 switch array and forcing the optical switches on and off, and
- 8 a plurality of holes on the backside of the silicon substrate each
- 9 aligned with an optical switch and guiding an optical beam to the optical switch.
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- 11 2. An optical switch array assembly of claim 1 further comprising an
- 12 addressing circuit integrated in the silicon substrate with the optical switch array
- 13 and locating each optical switch.
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- 15 3. An optical switch array assembly of claim 1 further comprising a glass
- 16 plate mounted on the top of the silicon substrate.
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- 18 4. An optical switch array assembly of claim 1 further comprising a plurality
- 19 of DNA probes disposed on the surface of the glass plate.
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- 21 5. An optical switch array assembly of claim 1 further comprising a plurality
- 22 of hybridized DNA probes disposed on the surface of the glass plate.
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1           6.     An optical switch array assembly according to claim 1, where said  
2           optical switches are Fabry-Perot cavity based optical switches.

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4           7.     An optical switch array assembly according to claim 4, where  
5           said DNA probes are light-synthesized DNA probes.

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7           8.     An optical switches array assembly according to claim 1, where  
8           said optical switches can be switched on and off for releasing and blocking  
9           said optical beams.

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11          9.     An optical switch array assembly according to claim 4, where  
12          said light beams are directed to sites where said DNA probes are light-  
13          synthesized.

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15          10.    An optical switch array assembly according to claim 5, where  
16          said light beams are directed to sites where said hybridized DNA probes  
17          are light-detected.

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19          11.    A method of making an optical switch array assembly comprising  
20          the steps:

21                preparing a silicon substrate with a driving circuit and an  
22                addressing circuit fabricated based on a standard MOSFET process,  
23                depositing an anti-reflective layer on the surface of the silicon  
24                substrate,

1                depositing a first mirror layer on the surface of the anti-reflective  
2 layer,  
3                depositing a sacrificial layer on the surface of the first mirror layer,  
4                depositing a second mirror layer on the sacrificial layer,  
5                forming a plurality of refilled trenches to define a plane  
6 configuration for a Fabry-Perot cavity,  
7                performing metallization to form electrical interconnections and  
8 spacers,  
9                performing deep etching to create holes on the backside of the  
10 substrate, and  
11                mounting a glass plate on the top of the substrate.

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13        12.    A method of making an optical switch array assembly according to  
14 claim 11, further comprising a step for synthesizing a DNA probe array on  
15 said glass plate by light illumination.  
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17        13.    A method of making an optical switch array assembly, according to  
18 claim 11 where said anti-reflective layer is a silicon dioxide layer.  
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20        14.    A method of making an optical switch array assembly, according to  
21 claim 11 where said first mirror layer is an amorphous silicon carbide  
22 layer.  
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1 15. A method of making an optical switch array assembly, according to  
2 claim 11 where said first mirror layer is a silicon nitride layer.

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4 16. A method of making an optical switch array assembly, according to  
5 claim 11 where said sacrificial layer is a silicon dioxide layer.

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7 17. A method of making an optical switch array assembly, according to  
8 claim 11 where said sacrificial layer is an aluminum layer.

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10 18. A method of making an optical switch array assembly, according to  
11 claim 11 where said second mirror is an amorphous silicon carbide layer.

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13 19. A method of making an optical switch array assembly, according to  
14 claim 11 where said second mirror layer is a silicon nitride layer.

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16 20. A method of making an optical switch array assembly, according to  
17 claim 11 where said refilled trenches are filled with silicon dioxide.

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19 21. A method of making an optical switch array assembly, according to  
20 claim 11 where said refilled trenches are filled with an amorphous silicon-  
21 silicon dioxide-amorphous silicon sandwiched plug.

1        22.    A method of making an optical switch array assembly, according to  
2        claim 11 where said refilled trenches are filled with an amorphous silicon-silicon  
3        dioxide-amorphous silicon sandwiched plug.  
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